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Abstract

Laboratory studies demonstrate negative relationships between Emotional Intelligence (EI) and cortisol responses (Mikolajczak, Roy, Luminet, Fillee & De Timary, 2007). The current study examined whether EI influenced stress reactivity in an applied setting, with students giving group oral presentations. Participants were either presenters (high stress condition) or observers (controls); cortisol and mood were measured within subjects at three time points (baseline, time 2 [20 minutes after onset] and time 3 [40 minutes after onset]). The stress manipulation successfully increased cortisol scores (AUCg and AUCi) in presenters. No significant relationships emerged between cortisol and either total EI or EI subscales, although the emotional control subscale predicted mood. Results may indicate that EI influences stress processes in some students but not others, they may reflect the study methods and EI measure used, or they may reflect the complexity of group assessments. Content validity of EI measures is a contentious issue and domain coverage varies between measures; coverage of the chosen EI measure may have influenced findings. Additionally, increasing ecological validity decreased experimental control, removing the ability to impose strict timings on saliva collection; potentially impacting on results. Alternatively, EI may have insufficient influence over group assessment to impact on physiological stress responses.

1. The relationship between emotional intelligence and stress in educational settings

1.1 The relationship between Emotional intelligence, stress, and health

Emotional intelligence (EI) is a multifaceted construct which encompasses a range of emotional skills including emotion perception and expression, the understanding and analysing of emotion, reflective regulation of emotion, and emotional facilitation of thinking (Mayer & Salovey, 1997). When assessed via questionnaires and rating scales the construct is conceived as a constellation of emotional perceptions and referred to as 'trait emotional intelligence' (Petrides, Pita, & Kokkinaki, 2007). Past research has revealed that emotional skills are correlated with a range of physical health outcomes, for example emotion regulation has been found to be related to general health (John & Gross, 2004), while emotional expression has been found to improve immune responses (Petrie, Booth, Pennebaker, Davison, & Thomas, 1995). Furthermore, amygdalar activity has been found to predict cardiovascular disease, reportedly though increasing bone marrow activity and arterial inflammation (Tawakol et al., 2017). The relationship between EI and health has also been explored, and a number of studies have found that scores on trait emotional intelligence tests are predictive of self-reported health (Dawda & Hart, 2000; Day, Therrien & Carroll, 2005; Extremera & Fernández-Berrocal, 2002; Mikolajczak, Luminet & Menil, 2006; Slaski, & Cartwright, 2002; Tsaousis & Nikolaou, 2005).

While past studies have provided evidence of a positive association between EI and health (Slaski, & Cartwright, 2002; Tsaousis & Nikolaou, 2005), there is only a limited body of research that has sought to understand the paths by which emotional skill and understanding might protect health (Lumley, Stettner & Wehmer, 1996). Research suggests that EI may promote better health through its action of moderating the relationship between stress and health (Mikolajczak et al., 2006), either through its influence on behaviour or physiology. Evidence supporting that notion includes findings of a negative relationship between EI and both self-reported feelings of stress (Landa, López-Zafra, Martos & Aguilar-Luzón, 2008; Oginska-Bulik, 2005) and feelings of inability to control life events (Gohm, Corser & Dalsky, 2005). Objective studies of stress responses have also explored the relationships between trait EI and physiological stress reactivity in controlled laboratory settings, with results revealing trait EI is associated with less mood deterioration, and is a significant moderator of the relationship between stressor exposure and cortisol reactivity (Mikolajczak, Roy, Luminet, Fillee & De Timary, 2007; Salovey, Stroud, Woolery & Epel, 2002).

1.2 Emotional intelligence and stress in educational settings

Controlled laboratory studies have suggested that EI moderates the relationship between non-naturalistic stressors and cortisol reactivity (Mikolajczak et al., 2007b; Salovey et al., 2002), but that association has not been examined in real world settings. Although tightly controlled conditions create greater internal validity (i.e. reduce confounding factors) in studies exploring the potential association between trait EI and stress reactivity, it is also desirable to replicate findings in studies with high external validity (i.e. where the results of the study can be more readily generalised to the real world). It cannot be assumed that in real world settings people will respond to stressors in the same way as they would in a lab setting. For example, students who undertake oral presentations as part of course assessment are not passive recipients of this stressor: they can take steps to reduce feelings of stress by studying or practicing more. The amount of stress students perceive themselves to be experiencing can be conceived as a balance between the extent of the challenge they face, and the resources they believe themselves to have to meet the challenge (Lazarus & Folkman, 1984). This means that students can decrease the apparent magnitude of the stressor they face by increasing their capability, by engaging in positive self-talk about their ability, or through using positive frame of mind to decrease the perceived social consequences of task failure. If students can reduce the perceived magnitude of the stressor they face, then they are likely to reduce their corresponding physiological response.

EI includes both interpersonal and intrapersonal emotional skills, so it is reasonable to suggest that EI might be associated with the ability to create a positive attitude towards studying, public speaking practice, assessment, and assessment feedback. Skill with emotional control may help prevent difficult or unhelpful emotions from arising, while skill with emotion management may help individuals to tackle unhelpful emotions once they have arisen. EI is associated with creating positive thoughts and feelings, potentially including those towards study and thus, it may be predictive of reduced stress responses in educational settings. Indeed, EI has been found to be supportive of better educational achievement, moderating the relationship between cognitive ability and academic performance, and being negatively related to unauthorised school absence (Petrides, Frederickson & Furnham, 2004). However, although EI might help to promote positive self-talk, conceivably appraisals that 'everything is fine' could be indicative of avoidant coping strategies. Although higher EI may include greater emotional control, and, therefore, an ability to reduce feelings of anxiety, a moderate level of perceived stress is useful in eliciting peak performance (Teigen, 1994). It is possible that perceived stress in the run up to a presentation assessment motivates some students to work harder or prepare more, and, thus, have reduced physiological responses on the day of assessment, despite having lower EI. Furthermore, although motivation is good for driving study behaviour, conversely, apathy or minimising the value of the assessment could reduce the emotional intensity a student experiences, and, thus, reduce the importance or significance of the perceived challenge they face. Negative attitudes could reduce stress responses by allowing students to minimise the perceived consequences of task failure. So, although high EI might be expected to be predictive of lowered stress responses, conversely so might the indifference or lack of engagement hypothetically associated with lower EI. For EI to demonstrate utility it needs to be able to predict stress reactivity against this complex backdrop of cognitive, emotional, and behavioural activity.

Past research on negative affective responses in controlled lab settings has reported higher trait EI to be related to lower mood deterioration (Mikolajczak et al., 2007b), reduced emotional reactivity (Mikolajczak et al, 2007a), and perceptions of stressors as less threatening (Salovey et al., 2002). Therefore, for students giving oral presentations it is likely to be beneficial to have higher EI. Past research has also reported specific aspects of emotional intelligence as being implicated in attenuating stress responses; in separate studies Salovey et al.(2002) found subscales measuring ‘attention to emotions’ and ‘clarity of emotions’ to be related to lowered cortisol responses. Meanwhile, Mikolajczak et al. (2007b) found that global trait EI scores, and EI subscales all displayed similar response patterns, being negatively related to cortisol at baseline, cortisol at peak, and increases in negative affect. However, these relationships need to be tested in a real world setting.

1.3 The present study

The current study sought to measure the association between trait EI and cortisol reactivity. In a meta-analysis, the conjunction of cognitive demand, motivated performance, and socially evaluative threat was associated with a fourfold higher effect size than a simple cognitive demand task (Dickerson & Kemeny, 2004); in the present study the assessed student presentations incorporate these features but in a naturalistic context. The first goal of this study was to explore the relationship between trait EI and salivary cortisol in students before and after oral presentations. The second goal of the study was to explore the relationship between trait EI and both tense and energetic mood in these students before and after their oral presentations.

2. Method

2.1 Design

A mixed design was used for the current study. Stress was operationalised on two levels: (1) high stress – participants giving oral presentations, and (2) controls – participants in the same group but who were watching rather than giving presentations. All participants gave repeated measures for both salivary cortisol and mood at three points in time (before the assessed presentations, 20 minutes after stressor onset, 40 minutes after stressor onset). The schedule of these data collection points follow recommendations based on meta-analysis, these timings being associated with the largest possible effect sizes (Dickerson & Kemeny, 2004). The relationships between Trait EI, mood, and cortisol reactivity were then investigated through correlational and regression analysis.

2.2 Participants

Participants were undergraduate students contacted through verbal announcements in lectures requesting they participate in a salivary cortisol study during the presentations they were due to give for course assessment. Ninety eight participants gave saliva samples for analysis, of these 4 participants had cortisol results which were discarded as unreliable, 3 gave saliva samples that were too small for analysis, and 2 failed to complete mood questionnaires.

Of the 89 cortisol participants used in analyses, 32 were non presenters (control condition) and 57 were presenters (high stress condition). Of the participants in the high stress condition, 15 (26.3%) were male and 42 (73.7%) were female; their ages ranged from 18 to 37 (mean 19.91, standard deviation 4.23). For the participants in the control condition, 5 (15.6%) were male and 27 (84.4) were female; their ages ranged from 18 to 22 (mean 18.59, standard deviation .18). From an experimental perspective it would have been ideal to ask student participants to refrain from smoking, drinking alcohol, eating, or consuming caffeine for 2 hours before the study, however as the stressor was an element of coursework it was not possible to control this. Therefore, food, caffeine, smoking, and alcohol were included in analyses as control variables.

2.3 Materials

Emotional Intelligence was measured using the Swinburne University Emotional Intelligence Test (SUEIT; Palmer & Stough, 2001) which demonstrates good content validity as the measure's five factors represent suitable coverage of the EI domain mapping well on to the (1997) Mayer and Salovey model. Alternative measures containing correlates of EI such as stress management (e.g. Bar-On, 1997) could be considered problematic for research exploring stress reactivity; these measures provide reduced theoretical distinction between predictor variables and study outcomes. The SUEIT was, therefore, chosen due to it having good theoretical coverage of the EI domain while being distinct from stress, appraisal, or coping variables. The SUEIT has five subscales: Emotional Recognition and Expression (the ability to identify and express own emotions), Understanding the Emotions of Others (the ability to understand the emotions of other people from verbal and non-verbal cues), Emotions Direct Cognition (the ability to use emotions in decision making and problem solving), Emotion management (managing the positive and negative emotions of others and one's own self), and Emotional Control (the ability to control strong emotions, including anger and frustration).

Subscales of the SUEIT are comparable with those in other published studies exploring EI and cortisol; The TMMS used by Salovey et al (2002) found subscales for 'attention to emotions' and 'clarity of emotions' to be predictive of cortisol reactivity, these subscales appear similar in content to the SUEIT subscales for 'Emotional Recognition and Expression', and 'Understanding Emotion'. These SUEIT subscales also appear similar in coverage to the TEIQue subscale for Emotional sensitivity (comprising facets of Empathy, Emotion perception, Emotion expression and Relationships), which was found to be predictive of cortisol and mood deterioration in response to stress (Mikolajczak et al., 2007b).

As a measure of Trait EI, this questionnaire allows participants to subjectively rate their own emotional skills. A benefit of self-report measures are that they are quick to administer; in the real world educators will also want to assess EI in the classroom, therefore they will prefer to select measures suited to the time constraints they work within. The SUEIT has demonstrated utility by explaining unique variance in a number of published studies predicting outcomes such as life satisfaction (Gannon & Ranzijin, 2005), leadership (Downey, Papageorgiou & Stough, 2006), and critical and detached behaviour (Moss, Ritossa & Nga, 2006). Relating to stress, the SUEIT has been found to moderate the relationship between exposure to work stress and burnout (Görgens-Ekermans & Brand, 2012); a version of the SUEIT has been found to predict psychological resilience to negative life events (Armstrong, Galligan, & Critchley, 2011), and the adolescent SUEIT has been found to be predictive of coping styles (Downey, Johnston, Hansen, Birney, & Stough, 2010). However, the validity of the SUEIT to specifically predict stress resistance and physiological indicators is so far unknown.

The SUEIT has been shown to have good internal reliability (Rajendran, Downey & Stough, 2007) and test re-test reliability (Palmer & Stough, 2001). For the current study, Cronbach alpha coefficients for EI subscales were all over α=.7, except for Emotions Direct Cognition (α=.552).

Affect arousal was measured using the Activation Deactivation Adjective Checklist (ADACL; Thayer, 1986). This checklist contains adjectives reflecting either end of two dimensions of mood activation, Energetic-Tired and Tense-Calm, and it comprises 16 items asking participants to grade the extent to which they feel a number of emotions on a scale of one to four (four being high). In combination, these items measure four dimensions of affect-energy (active, energetic, vigorous, lively, full-of-pep), tiredness (sleepy, tired, drowsy, wide-awake, wakeful), calmness (placid, calm, at-rest, still, quiet), and tension (jittery, intense, fearful, clutched-up, tense). Energy and reverse scored tiredness were combined to create the scale ‘Energetic’, while tension and reverse scored calmness were combined to create the subscale ‘Tense’. Participants were asked to report how they felt at the moment they completed the checklist. The ADACL is well established as reliable and valid (Thayer, 1986), and has demonstrated real world utility (e.g. Ekkekakis, Hall, & Petruzzello, 2005). For the current study Cronbach alpha coefficients for energy and tensions were greater than 0.72.

Salivary Cortisol. Saliva samples were taken using a salivette saliva sampling device (Sarstedt LTD, Leicester, UK). Following saliva collection samples were stored at -20^{o}C until analysis. Saliva was recovered by thawing the salivette at room temperature for fifteen minutes, then centrifuging samples for fifteen minutes at 1500rpm. Salivary cortisol concentration (nmol/l) was determined in duplicate using Enzyme-linked Immunosorbent Assays (ELISA) with a commercial kit produced by DRG Instruments GmbH, Germany. Cortisol was tested in assay plates; a one way ANOVA was conducted to explore the difference in means between the cortisol assays. One assay gave results which were significantly different to all the other tests ($F(14, 506) = 32.61$, $p<.001$); the results of this assay were discarded as unreliable. Collection and presentation of cortisol in this way is consistent with clinical advice (Hanrahan, McCarthy, Kleiber, Lutgendorf & Tsalikian, 2006).

2.4 Procedure

2.4.1 Experimental procedure

Participants were part of a class of students giving 20 minute oral presentations being graded by tutors and observed by peers as part of first year course assessment. In lab setting, socially evaluated presentations have been found to provoke robust physiological stress responses compared to other stress tasks (Dickerson & Kemeny, 2004); the presentation assessments used in this study were graded by tutors (all group members received the same grade) and observed by peers, and were, therefore, expected to elicit a cortisol response. However, within each presentation, although all group members spoke, the contributions of individual members varied in content and timing.

All the experimental data were collected between 2 and 5pm, minimising the effect of circadian hormone rhythms. Participants were given sampling packs, containing name labels and three sets of questionnaires and salivettes; these were colour coded red, amber, and green. At each time point participants were instructed to give unstimulated saliva samples by placing a salivette under their tongue for a two- minute period or until salivettes were soggy with saliva. Participants completed red questionnaires (EI, personality and mood) and samples at baseline (time 1) on arrival in the room, amber questionnaires (mood) and saliva samples at time two (time 2) immediately after their 20 minute presentation, and red questionnaires (mood) and saliva samples at time three (time 3), 40 minutes following the onset of their presentation.

2.4.2 Data screening procedure

Assumptions of multivariate analysis were investigated prior to statistical analyses. Before conducting the analyses, basic data screening was completed using procedures outlined in Tabachnick and Fidell (2001), to test dependent variables for normality and outliers, and to identify multicollinearity. Cortisol data demonstrated a significant positive skew so a square root transformation was performed.

2.5 Statistical analyses

To explore physiological stress reactivity, cortisol scores were used to calculate area under the response curve, both with respect to ground (AUCg) and to increase (AUCi) using the calculations detailed by Pruessner, Kirschbaum, Meinlschmid & Hellhammer (2003). The computed totals are useful as indicators of total cortisol concentration, and of cortisol change over time respectively. Furthermore, use of these scores can simplify analyses. To explore mood reactivity, mood change scores were calculated for peak mood change (time 2 scores minus time 1 scores).

To explore the success of the stress manipulation, along with the influence of global EI scores, regression analyses were conducted for each outcome measure. Stress condition was entered in step 1, global EI score was entered in step 2, and an interaction term of global EI (centre scored) and stress condition was entered in step three to explore moderation effects.

To explore the relationship between individual subscores and the stress response outcomes, a correlation table was produced.

3. Results

3.1 Manipulation check

Regression analyses revealed a main effect of stress condition for all measures of stress reactivity; these analyses indicate greater total cortisol (AUCg) in the stress condition than in the control condition (R^2 Adj = .062; $F(1, 87) = 6.843$, $p<.05$), greater cortisol increase (AUCi) in the stress condition than in the control condition (R^2 Adj = .066; $F(1, 87) = 7.192$, $p<.01$), greater tension decrease in the stress condition than in the control condition (R^2 Adj = .048; $F(1, 87) =5.477$, $p<.05$), and greater energy increase in the stress condition than in the control condition (R^2 Adj =.172; $F(1, 87) = 19.244$, $p<.001$). Inspection of means and standard deviations (see Table 1) demonstrate that, although tension scores reduced for the stress condition, they were elevated at baseline and remained higher at time two even after the alleviation of task completion. Overall, results demonstrate that the stress manipulation was successful.

3.2 Moderating effect of Trait EI on cortisol and mood.

Regression analyses revealed no significant main effect for total trait EI on cortisol levels or mood; there was no significant global EI x condition interaction for any measure of cortisol or mood stress reactivity (as reported in Table 2).

3.3 Relationships between EI subscales and stress responses

To explore the relationships between stress reactivity and EI subscales (Emotional Recognition and Expression [ERE], Understanding of Emotion [UE], Emotions Direct Cognition [EDC], Emotional Management [EM], and Emotional Control [EC]), a series of correlations were performed with the data from the high stress condition only (see Table 3). Results revealed only two significant relationships. Energy at baseline was significantly and positively correlated with both Emotion management and Emotional control. Checks for collinearity revealed Emotional control and emotion management were significantly related ($r=.664$, $p<.001$), so only Emotional control was used in the regression analysis. Note, Bonferroni corrections were not performed as they are likely to be too conservative (Perneger, 1998).

Table 1.

Means and standard deviations for cortisol, tense and energetic mood, by stress condition.

	Cortisol (NM/L)			Tension			Energy		
	Baseline	AUCg	AUCi	Baseline	Time 2	Time 3	Baseline	Time 2	Time 3
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
High stress	3.833 (0.600)	7.775 (1.133)	.110 (1.074)	22.632 (4.854)	20.702 (4.811)	15.123 (3.464)	20.965 (5.408)	23.070 (5.165)	20.018 (5.668)
Controls	3.813 (0.593)	7.145 (1.012)	-.481 (.841)	16.688 (5.294)	17.594 (5.587)	14.500 (4.024)	21.156 (4.629)	18.500 (5.187)	17.531 (5.118)

Table 2.

Regression analyses predicting cortisol and subjective responses by condition, total EI and their interaction.

	Cortisol				Mood change			
	AUCg		AUCi		Tension		Energy	
Predictor	ΔR^2	ß	ΔR^2	ß	ΔR^2	ß	ΔR^2	ß
Step 1								
Stress condition	.073	-.270**	.076	-.276**	.059	.243*	.181	-.426**
Step 2								
Total EI	.000	-.005	.016	.129	.004	-.066	.009	-.094
Step 3								
Condition x total EI	.000	.044	.000	-.001	.004	.192	.005	.214
Total adjusted R^2	.040		.061		.034		.166	
Model F	(3,85) =2.236		(3,85) = 2.889*		(3,85) = 2.041		(3,85) = 6.837**	
n	89		89		89		89	

(Note stressful condition was coded as 1, control condition was coded as 2) ****p<.05 **p<.01***

Table 3

Intercorrelations between EI subscales, cortisol and mood

	ERE	UE	EDC	EM	EC
Cortisol baseline	-.115	-.032	-.155	-.162	-.005
AUCg	.006	-.084	.039	.011	.095
AUCi	.134	-.053	.131	.168	.105
Tension baseline	-.071	.146	.076	.062	-.110
Tension change Time 2	.058	-.152	-.017	-.106	-.108
Energy Time 1	.148	.173	-.003	**.296***	**.346****
Energy change Time 2	-.117	-.005	-.040	-.203	-.210

*p<.05, **p<.01

3.4 EI subscales as predictors of stress response.

Regression analysis revealed that emotional control is the only significant predictor of energetic mood at baseline, making greater statistical contribution than the stress condition.

Table 4.

Regression analysis predicting energetic mood in students at baseline.

	Energetic Mood baseline	
Predictor	ΔR^2	ß
Step 1		
Stress condition	.000	.018
Step 2		
Emotional control	.084	.297**
Step 3		
Condition x Emotional control	.009	-.289
p 3		
Total Adjusted R^2	.061	
Model F	(3, 85) = 2.912 *	
n	89	

p<.05 **p<.01

4. Discussion

This study sought to test stress reactivity in an educational setting, and results confirm that the current manipulation was successful: students presenting work for assessment had significantly greater cortisol increases (AUCi) and total cortisol scores (AUCg). Furthermore, mood scores demonstrate that those presenting their work had greater tension in anticipation of stressor onset, with scores recovering once the stressful task was completed. Energy scores peaked after the stress task for those completing presentation assessments, while for observers it peaked at baseline and decreased at subsequent time points. Exploration of EI subscales revealed that Emotional Control was predictive of higher energetic mood at baseline for students in both conditions. Energy in both presenters and observers at the onset of presentations can be considered beneficial, reflecting engagement and readiness for the assessment. In those presenting work, energy was helpful for audience engagement, while in observers greater energy suggests empathy and support of colleagues and interest in the performance of fellow group members. However, results of the current study revealed that EI was not significantly related to cortisol reactivity in students undertaking oral assessments as part of coursework. This is contrary to previous research in controlled lab settings which have reported trait EI to be a significant predictor of physiological stress response (Mikolajczak et al., 2007b; Salovey et al., 2002). The results of the current study may be a reflection that EI is more influential for some students than others in the way they experience and process stress, it may reflect the numerous factors involved in group work and assessment, or it could be a reflection of the methods and measures used.

First, results may be an indication that EI is potentially influential in predicting stress for some students, but not others. Previous work (Gohm, Corser & Dalsky, 2005) investigating the relationship between ability EI, self-reported EI, and self-reported stress symptomatology, found that ability EI predicted decreased stress, but only in students who were high in both self-reported emotional intensity and emotional clarity. In their study ability EI did not significantly predict stress in students who they termed ‘overwhelmed’ (high emotional intensity and low emotional clarity), or ‘cerebral’ (low emotional intensity and high emotional clarity). Based on these findings it may be the case that only when students have a strong emotional reaction *and* good understanding of why they are having this reaction i) they are motivated to take action to reduce their feelings of stress, and ii) know why and how to react in a meaningful way. Moreover, if a situation elicits a response with low emotional intensity then less effort is required to regulate these feelings (Barrett, Gross, Christensen, & Benvenuto, 2001), so level of EI would be less important for less intense individuals.

Second, it may be that, although EI can influence cortisol reactivity, the benefits of high EI are superimposed over a backdrop of complex inter and intra group dynamics which have greater influence over stress responses. Due to the numerous factors involved in group work and assessment, oral presentations are likely to be much more challenging for some groups compared to others. Furthermore, group dynamics may make the task more stressful for some individuals than others within their group. Although, theoretically, EI could be helpful in aiding group communication, maintaining a positive atmosphere, or resolving conflict, EI did not demonstrated significant positive influence over physiological responses in this study.

Fair distribution of work across the team, ease of communication, and mutual support are key predictors of student satisfaction in group tasks (Pang, Tong & Wong, 2011), and it is likely that the extent of the stressors varied in magnitude across the groups. Moreover, although students can engage in personal study or practice more, group dynamics will be outside the control of the individual students. Therefore, while the students with higher EI may be better equipped to deal with stressors or control stress responses, these results suggest that in the real world EI is not sufficiently influential to be visible. Future research may wish to explore how well EI can explain variance in individual presentation assessments, as these as experiences are more likely to be the result of personal thoughts, feelings, behaviours and abilities.

Finally, this research has a number of limitations. Conducting research in more ecological settings may provide information about the practical application of emotional intelligence, but, using student assessments meant that the timing of cortisol collection could not be as strictly controlled as in previously published laboratory research; even small differences in timings may have influenced results. Additionally, although the manipulation check confirms that the presenters did experience greater stress, inspection of the means and standard deviations also reveals that non presenters had higher cortisol values than might be expected in a control condition. This suggests that the students found it mildly stress provoking to watch other group members present work. Furthermore, while this research aimed to extend previous findings by exploring a real world setting, a different measure of EI was selected. It is possible that the absence of results is attributable to the predictive power of this measure. The SUEIT has demonstrated good predictive validity in other settings, nonetheless its use with cortisol is untested and, a general expected effect size has not been established.

It is important to note that there is wide variation in the content of various trait EI measures, both at subscale and individual item level; this is reflective of the disagreement amongst researchers about theoretically what should be covered within the EI domain. The implication of this is that total trait EI scores across different measures are likely to measure perceptions of quite different thoughts, feelings and behaviours. The SUEIT has content focussed around the ability EI model and, therefore, does not include questions or subscales assessing happiness, optimism, or stress management; potentially, it was this additional content that contributed to previous findings that global EI (measured by the TEIQue) was predictive of cortisol activity (Mikolajczak et al., 2007b). This said, it should be noted that the Trait Meta Mood Scale used by Salovey et al. (2002) is narrower in its coverage of the EI domain than the SUEIT and nevertheless cortisol reactivity was significantly related to its subscales attention to emotions' and 'clarity of emotions'. Looking at past research, it is perhaps surprising, therefore, that in the current study the SUEIT subscales for Emotional Recognition and Expression, and Understanding Emotion, were not found to be predictive of stress reactivity. It is worth remembering that null hypothesis significance testing has limitations and that there is advice to evaluate research findings based on effect size rather than significance, especially given the arbitrary nature of alpha levels within significance testing, and that even small effects will become significant with a large enough sample size (Field,2013). Interestingly, inspecting the correlations between EI subscales and cortisol measures (see table 3), and applying guidance that correlation coefficients of r=.10 equate to small effects (Cohen, 1988), results presented above suggest small effects exist between EI subscales and baseline cortisol (being negatively related). Results between EI subscales and cortisol increase (AUCi) also display a small effect size (being positively related); unexpectedly, the direction of these relationships indicate that higher EI scores were associated with greater increases in cortisol from baseline. However, these small effect sizes suggest that, for the current study, EI explained around only 1% of the variance in cortisol levels.

5. Conclusions

If real world use is to be demonstrated then EI needs to be able to show that it can predict stress responses outside of the lab. This means that EI should be able to predict stress reactivity measured *after* the behavioural responses used by students to cope with the stress they feel. Educators want to know whether EI can be used to predict the way that students experience and respond to stressors; while lab studies demonstrate that EI can influence stress responses, the current study highlights that when using real world settings and different EI measures, the influence of EI on stress reactivity may not be apparent.

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